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SEPTEMBER 21, 1987

CHEMICAL & ENGINEERING

# NEWS

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More scientific news from ACS meeting in New Orleans

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## Paints & Coatings

Industry sales may top last year's record Page 51

CHEMICAL & ENGINEERING
NEWS

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SEPTEMBER 21, 1987

## News of the Week

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*Cover:* Du Pont top coat is applied in down-draft spray booth

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# NIH Chemistry Funding Losing Ground Relative to Other Disciplines

**Between 1977 and 1986 funding for chemical research increased only 110% while the overall NIH research budget was growing 300%**

NEW ORLEANS

Although the National Institutes of Health has long been a major funding source for chemical research, the exact amount of chemistry funding has been difficult to determine because NIH doesn't break out research funding figures by disciplines. However, a recently conducted analysis of NIH's fiscal 1986 budget reveals a chemistry research funding total of almost $140 million, according to Jerome G. Green, director of NIH's division of research grants. Green spoke at a symposium on issues in funding of chemical research and education, sponsored by the Division of Chemical Education.

The chemistry research funding amounted to 2.7% of NIH's total $5.3 billion budget, Green says. In comparison, the National Science Foundation's chemistry division provided a total of $85.8 million in fiscal 1986, whereas all NSF funding for programs involving at least some chemical research totaled $198 million.

According to Green, the $140 million in NIH chemistry funding includes $135 million for 1153 research grants, $2.6 million for 17 training grants, $2.0 million for 109 graduate fellowships, and $329,000 for three research contracts. Green's analysis of NIH's chemistry research funding excludes funding for biochemical research. Factoring in those numbers would raise the total substantially.

Another way to look at chemical funding is to examine NIH research grants classified as chemistry and structural chemistry of biopolymers. These figures show 1985 funding for chemical research increased 19% from 1984 to $134 million. The number of grants increased 8% to 1143. This growth rate slowed to almost a dead stop in 1986, with funding up 3% to $138 million and number of grants up only 4. Of course, 1986 was the year of the 4.3% automatic, across-the-board budget cuts imposed by Congress in an effort to reduce the federal deficit.

Still that's not all there is to it. Green notes that NIH funding for chemistry research has been losing ground over the past decade compared with other disciplines such as medicine and biochemistry. Between 1977 and 1986 funding for chemical research grants increased a bit more than 110% to $138 million. During the same period NIH's overall research budget increased 300% to $5.3 billion.

In part, Green attributes this less-than-stellar performance to requests for funding by chemistry departments not keeping pace with those from other departments engaged in biomedical research. He notes that competing research project applications from chemistry departments actually dropped from 851 applications requesting $118 million in 1985 to 788 applications requesting $117 million in 1986. The number of chemistry department requests isn't keeping pace in the current fiscal year either.

Green appears to be slightly puzzled by the declining number of applications. He points out that chemistry departments have an excellent success rate when it comes to competitive funding. In 1985 43% of the proposals were funded, in 1986 43.4%. The comparable success rates for all departments was 37.2% and 35.8%.

## Competing chemistry grants hit $138 million in 1986

| Institutes | 1986 Number | 1986 Amount ($ millions) | 1985 Number | 1985 Amount ($ millions) | 1984 Number | 1984 Amount ($ millions) |
|---|---|---|---|---|---|---|
| General Medical Sciences | 641 | $ 74.1 | 583 | $ 68.2 | 521 | $ 54.9 |
| Cancer | 196 | 24.0 | 210 | 23.2 | 199 | 21.2 |
| Arthritis, Diabetes, Digestive & Kidney Diseases | 67 | 9.1 | 97 | 12.5 | 105 | 11.6 |
| Arthritis & Musculoskeletal & Skin Diseases[a] | 23 | 2.9 | | | | |
| Heart, Lung & Blood | 76 | 11.3 | 85 | 11.7 | 83 | 10.3 |
| Allergy & Infectious Diseases | 54 | 6.7 | 61 | 7.8 | 61 | 6.4 |
| Neurological & Communicative Disorders & Stroke | 33 | 3.9 | 38 | 4.7 | 37 | 3.7 |
| Environmental Health Science | 18 | 1.7 | 21 | 1.8 | 18 | 1.5 |
| Other | 39 | 4.6 | 48 | 4.4 | 35 | 3.7 |
| TOTAL | 1147 | $138.3 | 1143 | $134.3 | 1059 | $113.3 |

**Note:** Research does not include biochemistry, but does include structural chemistry of biopolymers. a Formed in 1986. **Source:** National Institutes of Health, Division of Research Grants

## General Medical Sciences is major funding source for chemistry department research grants

| $ Thousands | Research grants[a] | | Fellowships[a] | |
|---|---|---|---|---|
| | Number | Amount | Number | Amount |
| **Institutes** | **1108** | **$124,512** | **106** | **$1974** |
| General Medical Sciences | 635 | 72,613 | 74 | 1352 |
| Cancer | 162 | 17,880 | 17 | 323 |
| Heart, Lung & Blood | 72 | 9,202 | 4 | 73 |
| Diabetes, Digestive & Kidney Diseases | 80 | 8,326 | 4 | 73 |
| Allergy & Infectious Diseases | 63 | 7,164 | 1 | 18 |
| Neurological & Communicative Disorders & Stroke | 26 | 2,626 | 1 | 20 |
| Environmental Health Sciences | 26 | 2,118 | 1 | 19 |
| Eye | 17 | 1,827 | 2 | 44 |
| Arthritis & Musculoskeletal & Skin Diseases | 8 | 1,000 | — | — |
| Child Health & Human Development | 10 | 950 | 2 | 52 |
| Aging | 6 | 496 | — | — |
| Dental Research | 3 | 310 | — | — |
| **Research Resources** | **45** | **10,391** | — | — |
| **Fogarty International Center** | — | — | **3** | **51** |
| **TOTAL** | **1153** | **$134,903** | **109** | **$2025** |

**Note:** Table includes both competing and noncompeting NIH awards. a Fiscal 1986. **Source:** National Institutes of Health, Division of Research Grants

Chemistry departments also do well when it comes to instrument funding. For example, in the Division of Research Resources' once-a-year competition for expensive ($100,000 to $300,000) instruments shared by at least three users, chemistry departments walked away with 18%, or $5.6 million, of the total funds awarded in 1986; 28%, or $8.8 million, in 1985; and 18%, or $3.5 million, in 1984.

And there are other opportunities for funding. For researchers who are just starting out, five-year, nonrenewable awards provide up to $350,000 for direct research costs in return for a commitment of 50% of a researcher's time and effort. Receipt dates for applications for the awards are Feb. 1, June 1, and Oct. 1.

In addition, once-a-year academic research enhancement awards are aimed at scientists in institutions that are not research-intensive, such as four-year colleges. Also available are the so-called area grants, mandated by Congress. Applications are submitted to and reviewed by the institutes in the normal manner but are funded from a specially appropriated fund that is running at about $12 million per year.

There has been quite a bit of talk and fear in the chemical community recently that NIH is supporting less chemical research. But as Green concluded at the symposium, "You don't get if you don't ask." He did admit, however, that a proposal has to be ranked very high in NIH's review process to get funded these days.

*Janice Long, Washington*

# NSF to seek science center proposals

NEW ORLEANS

The National Science Foundation expects to issue a program announcement of its new science and technology centers initiative this month, Kenneth G. Hancock, acting director of the chemistry division, told attendees at the Division of Chemical Education's symposium on issues in funding of chemical research and new education. NSF may devote up to $35 million to the initiative, which, he emphasizes, will be focused on basic research.

To be successful a proposal for a science and technology center will have to have a unifying intellectual theme, Hancock explains. It has to be more than just a collection of people who want funding for their individual research projects. There needs to be a close correlation between the planned research and a center's size, structure, and organization. The center must also have a strong educational component and be linked to other sectors of society, such as state and/or local governments, private industry, or the national laboratories. Matching funds, although encouraged, are not necessary, he adds.

There will be a single competition among proposals from all fields for the centers and an institution may submit multiple proposals on multiple topics or a single proposal on a single topic. The chemistry division will review the proposals that fall under its research areas, Hancock says, adding that the "review process is going to be awesome from start to finish" and will culminate with site visits for those on the short list for final funding.

The centers will have a finite life, Hancock explains. NSF will make an initial five-year funding commitment to a center. There will be an intensive review of the center's operations and accomplishments after three years, and, if all has gone very well, Hancock says, an additional five-year commitment could be made.

For those not quite ready to submit a full-fledged proposal, a university has the option of obtaining a $35,000 planning grant, which must be matched with an institution's own funds. Letters of intent will have to be submitted by Nov. 15. Formal center proposals will be due by Jan. 15, 1988, with planning grant proposals due Feb. 1.

Asked if he could provide some hints on the type of research NSF thought would be suitable for a center, Hancock replied: "I can, but I won't. I've learned that when the federal government speaks, everybody listens. We don't want to dictate the proposals. Everyone will have to use their own ingenuity in putting together the proposals."

*Janice Long, Washington*

# Paint Sales May Top 1986 High

**Marc S. Reisch,** C&EN New York

Though the pace of the paint and coatings business seems to have slowed in the first half of 1987, it nevertheless promises to be a year in which paint makers will finally ship $10 billion or more in paint.

Paint is a competitive business in which small producers have gone out of business and other producers have been absorbed by larger ones—some of them global paint producers such as Imperial Chemical Industries, BASF, and Du Pont. Yet the competition does not seem to have hurt the business. The U.S., it seems, is awash in paint.

According to statistics cited in C&EN's industry survey article beginning on the next page, paint makers shipped 967 million gal of paints and coatings in 1986 worth some $9.68 billion. Though shipments may be down this year, their overall value may be up, Department of Commerce figures show. This indicates that the market is strong enough to support a little extra margin for manufacturers, allowing them to pass along some of their increased raw material costs.

But competition among paint manufacturers remains keen. Despite slow growth in some segments such as automotive refinishing, examined in a section of this report beginning on page 56, manufacturers are meeting technical challenges. Some paint makers are developing new generation finishes to compete in durability and drying time with isocyanate-cured enamel coatings. Many are coming to grips with the environmental dangers posed by volatile organic compounds released when solvent paint formulations dry, even though the problem has not really affected auto body shops across the country yet.

The coil-coating market, another segment of the paint business examined in a section beginning on page 66, is a business that some observers may deem a lackluster, no-growth paint market. It is an industry bereft of a major end-use market: as auto makers resort more to in-house metal priming systems, there is less need for the zinc-rich coated steel for which Detroit once had a huge appetite. But coil-coating industry executives and their paint suppliers are exhibiting imagination and are targeting end-use markets that are here now, such as appliances.

# Shipments may decline, but value may surpass $10 billion this year

*Civic center with steel panels coated with Glidden's fluorocarbon paint*

Last year was a banner year for paint production. U.S. manufacturers shipped a record 967 million gal of paint and coatings worth $9.68 billion, according to the Department of Commerce. The 3% growth in shipments in 1986 and the 5.4% growth in the value of those shipments in 1986 is no small accomplishment given the large size of the paint and coatings market.

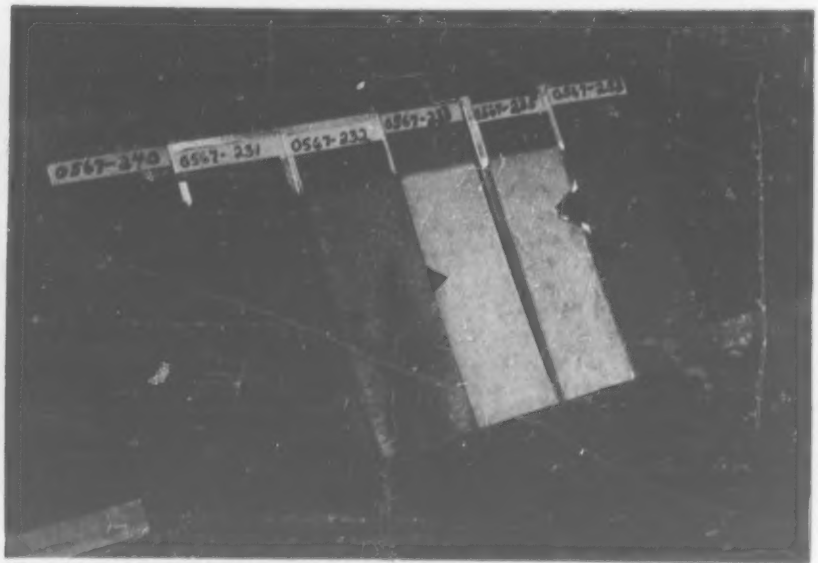
There is more than a little life left in a business that has been characterized as mature, highly cyclical, and largely dependent on volume markets. Because of a continuing ebullient economy, 1986 shipments increased in every category served by paint and coatings manufacturers: architectural coatings, product coatings sold to original equipment manufacturers (OEM), and special-purpose coatings.

Preliminary government figures show, however, that the pace of U.S. production slowed in the first half of 1987. Real gross national product declined from an annual growth rate of 4.4% for the first quarter to 2.5% in the second quarter. The slowdown has already affected 1987 paint and coatings shipments. Unless the economy along with the paint industry experiences an unusually strong second half, the industry will not only be hard pressed to match last year's shipment figures, but also will be unlikely to surpass the billion-gallon shipment mark.

For the first six months of this year, shipments declined 2.7% to 509 million gal compared with the first six months of 1986. Shipments of architectural coatings, at 257 million gal for the first six months of 1987, remained virtually unchanged from the same period in 1986, whereas those of product coatings increased a slim 2.4% to 179 million gal. And shipments of special-purpose coatings slid 20% to 72 million gal.

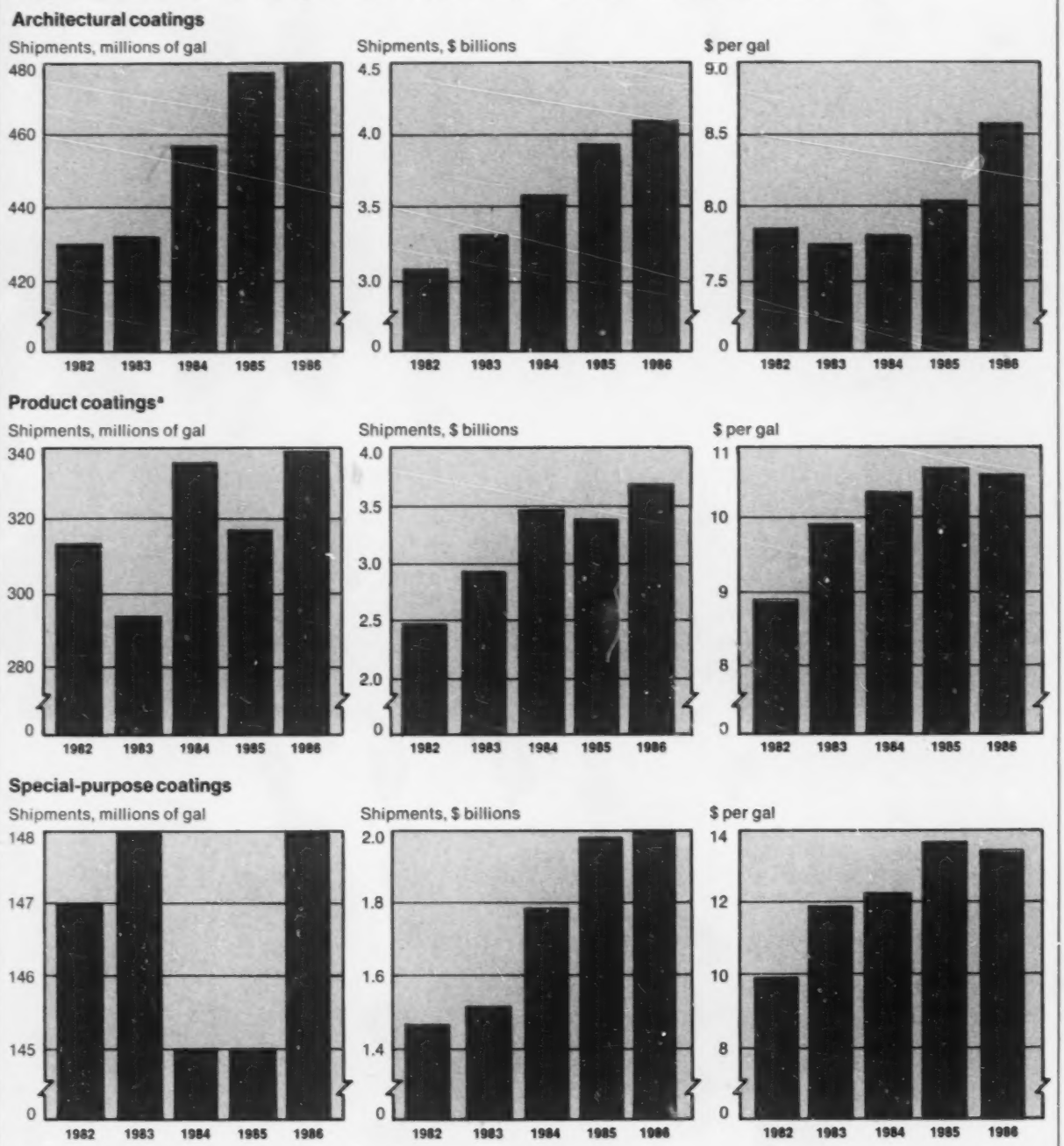
However, the value of paint shipments in the first six months increased 6.8% to $5.3 billion, compared with the like period in 1986. And at this rate of increase, they may finally crack the elusive $10 billion mark. The value of architectural coatings rose 4.4% to $2.2 billion, and product coatings increased in value an impressive 13% to $2.0 billion. Special-purpose coatings grew a marginal 1.1% to $1.0 billion.

This year will not be so good a year as 1986 for the paint industry, forecasts Business Trend Analysts (BTA), Commack, N.Y., a market research firm. However, it does predict an increase in the value of shipments. In a study of the paint and coatings industry it intends to publish at the end of this month, the Long Island-headquartered consultant looks for a 4.5% increase in 1987 sales of paint and coatings, but notes that "slow price gains in the architectural coatings segment, coupled with slackening durable



*Panels coated with different paints that have been exposed for 16 years in subtropical Florida at a 45° angle facing south. Top 2 inches or so of the panels were covered by the rack and represent the original colors of the panels. Blue panels on each end, coated with Glidden fluorocarbon paints, show how such coatings resist color change when exposed to hot sun*

## Shipments rise in all categories, but prices up only for architectural coatings




a Original equipment manufacturers. **Source:** Bureau of the Census

goods output, portend a lackluster 1987 market performance."

A 1986 profile of the industry based on Bureau of the Census figures shows that architectural coatings, which include both interior and exterior house paints, continue to make up almost half of all paint sold in the U.S. Product coatings for the original equipment market, which includes automotive and appliance coatings, accounts for some 35% of U.S. paint volume. And special-purpose coatings comprise about 15% of total paint shipments. That category includes large-volume maintenance items, automotive refinishing, and coil coatings.

Shipments of architectural coatings in 1986 increased marginally from 1985 to 480 million gal. However, the value of shipments continued to improve, up 7.6% last year to $4.12 billion, and the unit price

## Three main paint categories break down this way

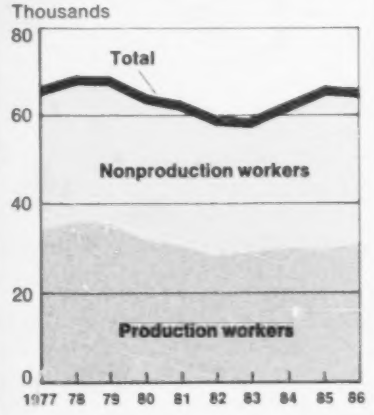
**Architectural coatings**
Exterior house paints
Interior house paints
Undercoaters, primers & sealers
Varnishes
Stains

**Product coatings**[a]
Wood furniture & fixtures
Automotive
Metal containers
Machinery & equipment
Factory-finished wood
Metal furniture & fixtures
Sheet, strip & coil
Nonautomotive transportation
Appliances
Electrical insulation
Marine
Film, paper & foil
Pipe
Toys & sporting goods
Miscellaneous consumer & industrial products

**Special-purpose coatings**
Automotive & machinery refinishing
High-performance maintenance
Traffic paint
Bridge maintenance
Aerosols
Swimming pool coatings
Arts & crafts
Metallic coatings
Multicolored coatings

a Original equipment manufacturers. **Source:** SRI International

## Paint production worker employment rose in 1986




**Source:** Department of Labor

per gal increased 6.7% to $8.56. Despite its reputation as a lackluster category, architectural coatings was the only segment to show an increase both in shipments and value in 1986. Analysts suggest that the decline in interest rates along with a pickup in housing starts has spurred demand for more single family homes for the baby boomers, and that this trend will continue into 1987.

Product coatings shipments for the OEM sector increased 6.9% in 1986 to 339 million gal. Though the value of product coatings shipments rose 5.6% last year from [illegible]85, unit price declined 1.3% to $[illegible]3 per gal.

Similarly, special-purpose coatings shipments and total value of those shipments increased, but unit value declined in 1986. According to the government figures, special-purpose coatings shipments increased 2.1% to 148 million gal in 1986, and the value of those shipments increased 1.0% over 1985. However, unit price declined 1% to $13.47.

Areas such as water treatment equipment and hazardous waste treatment equipment will lead an increase in demand for paint, according to Jay R. Willner, president of WEH Corp., San Francisco-based market analyst concentrating on certain industrial and special-purpose coatings markets. The market for bridge and highway coatings also likely will show a strong increase in demand, says Willner, as many of the nation's busiest byways are in serious need of attention. Higher-priced, long-lasting coating systems will be the answer, he adds.

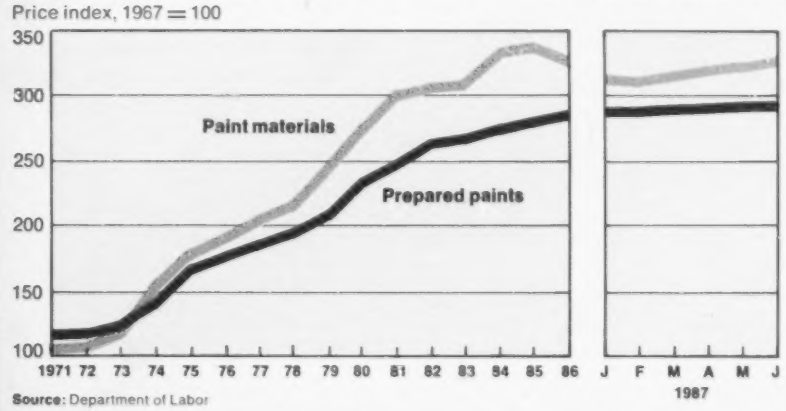
Willner says that demand for marine coatings is down as new marine construction in this country is "dead," and offshore oil drilling activities are flat.

One major trend in the maintenance coatings business is a movement to farm out the maintenance of large petroleum refining, petrochemical, and pulp and paper plants to specialists. In this case a supplier takes responsibility for assuring a plant is maintained according to ordinances, sand blasting and coating equipment and plant as necessary, Willner says. Leaders in this new marketing approach to plant coatings and maintenance include Du Pont and PPG Industries, he says.

Overall, the paint business remains a highly competitive one despite the litany of mergers and acquisitions that have tended to concentrate it into fewer hands. The past few years have seen a number of changes. For instance, Imperial Chemical Industries purchased Glidden, BASF purchased Inmont, Du Pont sold its Lucite line of paints to Clorox, and Valspar bought Mobil's U.S. and Canadian coatings operations.

Despite the numbers of purchases and acquisitions, industry sources report there still are about 1000 paint manufacturers in the U.S. (down from about 1500 in 1963, says one

## Gap is widening again between raw material, paint prices




**Source:** Department of Labor

source). Because of the competition, product advances do not readily translate into huge profits because competitors quickly catch up with advances of their own. Pricing is frequently the manufacturer's key to a larger share of the market and thus greater profits. And in a bid for greater share of market, manufacturers have tempered price increases even though raw material costs are increasing much faster.

According to the Department of Labor, price indexes covering both paint materials and prepared paints for the first six months of 1987 show that, after a brief hiatus in 1986, prices of raw materials continue to increase faster than prices of prepared paint. The index for paint material prices rose 5.4% from January to June 1987 to 332.5 (1967 = 100), reflecting recent increases in polymers and runups in the price for titanium dioxide. However, during the same time, the index of prepared paint prices has increased only 0.09% to 284.1 (1967 = 100).

In the past, the gap between the two indexes widened steadily as manufacturers in a competitive market held prices below their increases in raw material costs. In 1979, the index for raw material prices swung up decisively and manufacturers again held prepared paint prices pretty much in check. For 1979, the index for raw material prices increased 13% from the previous year to 241.2, whereas that for prepared paint prices rose only 5.7% to 204.4.

Even though steady raw material price increases between 1980 and 1985 averaged 4.1% and prepared paint price increases during the same period averaged only 3.3%, the raw material price index dropped in 1986 to 318, down 4.9% from the previous year. Prepared paints manufacturers took advantage of the improved situation to take a modest increase. Last year the prepared price index increased 1.6% to 381.2.

The dip in raw materials prices in 1986, explains Business Trend Analysts (BTA), stems from the decline in the price of crude oil from which paint resins, solvents, linseed oil, and tall oil are derived. The drop in raw materials prices did not bring about a wave of competitive price cuts, BTA adds, because of increased industry R&D expenditures. These increased expenditures were mandated by government regulation in the disposal of solvent waste and pollution control.

To their credit, paint manufacturers have been able to produce more paint as the level of employment has slowly declined. According to Department of Labor statistics, the total number of production and nonproduction paint industry workers declined 3.9% to 63,400 between 1977 and 1986. The number of workers in the industry was the same in 1986 when manufacturers produced 967 million gal of paint as in 1981 when paint manufacturers made only 870 million gal.

From 1977 to 1986, the number of nonproduction employees of paint firms rose 5.8% to 32,700 as the companies boosted their marketing efforts. Employment of nonproduction workers peaked in 1985 at 33,600.

The industry achieved its record 1986 output with 2.7% fewer nonproduction workers than in 1985. A 2.3% rise in production worker employment to 30,700 helped it realize a 3% improvement in shipments in 1986 to 967 million gal.

# Automotive refinishing poses huge and changing market

By one estimate, paint and auto body shops do an astounding $10 billion in collision repair and refinish work annually. But this business is growing only 1 to 2% annually, most industry observers say.

Few paint companies heavily involved in automotive paints, however, can ignore this enormous market, which in 1986 consumed some 66 million gal of paints, about 45% of the category defined as special-purpose coatings by the Department of Commerce. These paints had a value of about $895 million.

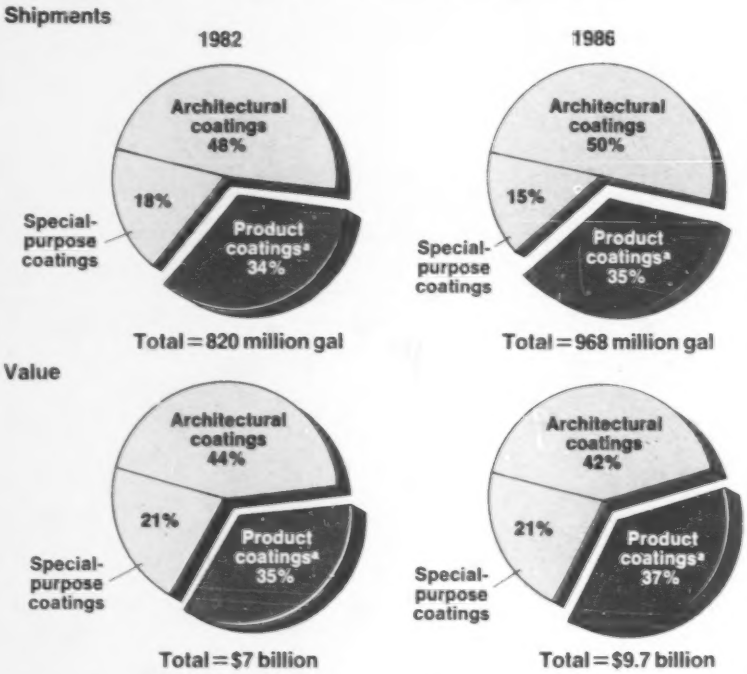
The automotive refinish paint industry itself is slowly changing. First, paint makers have introduced formulations and refinish systems compatible with the latest base-coat/clear-coat technology that is becoming more prevalent among original equipment manufacturers (OEM). Second, many manufacturers have only recently announced isocyanate-free paint formulations that promise the performance of isocyanate-containing paints. Third, although emissions of volatile organic compounds are mostly a concern at the OEM level, paint makers are thinking now about ways to address the problem at auto body shops if and when they become an issue. (Volatile organic compounds are pollutants that may foul the air as solvent paint formulations dry.)

*Harrick: urethane paint use will grow*

Statistics on the automotive refinish market generally include truck and bus repair as well. However, passenger cars account for 75% of sales in this market, industry sources indicate. Major suppliers to automotive refinish jobbers and ultimately to the auto body shops include primary OEM suppliers PPG Industries, Du Pont, and the Inmont division of BASF. Other paint makers, such as Sherwin-Williams and the Sikkens division of Akzo Coatings, also have secured niches in the automotive refinish market.

All these suppliers are watching closely to see if U.K.-based Imperial Chemical Industries, which recent-

**Architectural coatings still lead paint shipments and value, but product coatings grow in both categories**




[a] Original equipment manufacturers. **Source:** Bureau of the Census

ly purchased U.S. paint producer Glidden, will attempt to enter both the OEM and automotive refinish markets in the U.S. ICI is a major European supplier of both OEM and automotive refinish paints.

A major force in the automotive refinish market by virtue of its position as a supplier of polyurethane raw materials, including the polyisocyanate quick-curing additives, is Mobay. According to G. Thomas Harrick, vice president and general manager of Mobay's coatings division, most major paint companies use Mobay's Desmodur polyisocyanate ingredient in some of their formulations, primarily to provide a harder finish but also to speed drying and reduce dust pickup, an almost universal problem in the auto body shop. Harrick estimates that urethane paints make up half of all automotive refinishing formulations.

Urethane paint systems offer numerous advantages, he points out, especially the two-component system in which the polyisocyanate ingredient is added to the paint formula just before spraying a vehicle. Urethane coatings, he says, improve the final appearance of a painted vehicle because they provide excellent gloss, distinctness of image, and durability. In addition, they resist chipping and do not readily etch and break down.

However, polyisocyanates require care in handling because fumes of polyisocyanate-modified acrylic paints may be harmful if a painter inhales them. The problem, says Harrick, is that of the 70,000 automotive repair shops he estimates are operating in the U.S., there are many small shops that may not take adequate precautions to protect workers. All painters should know that "it is not healthy to breathe polyisocyanate-modified paints or any other resins and solvents," he says.

Painters must wear protective breathing equipment, Harrick points out. He also says that Mobay offers a free safety monitoring service and will provide body shops with a written report on how and where ventilation must be improved.

Despite the recent introduction of new automotive refinishing formulations from Du Pont and PPG and a scheduled introduction of such formulations next year from the Inmont division of BASF claiming urethane performance without the polyisocyanate ingredient, Harrick is confident the market for polyurethanes will expand. "From the samples we have of what's out there, we don't feel that any new products on the market match the performance of urethane paints."

Overall, says Harrick, the automotive market has been "a consistent business. It's not a business that necessarily grows each year. It may have even declined some in recent years." He sees three major reasons for the decline. First, the number of smaller cars, with consequently less surface to cover, has increased. Second, more insurance companies are "totaling" cars involved in accidents because of sky-high repair costs. Third, paint supplied at the OEM level resists corrosion today better than ever before, and, as a result, fewer people are bringing cars in for cosmetic repairs.

Still, Harrick expects urethane paints use to grow as a percentage of both OEM and the automotive refinish business because, he says, they perform better than the alternatives. More OEMs will use urethane paints as the clear-coat component in the new base-color-coat/clear-cover-coat systems major manufacturers are now phasing in. And as more plastic components are used on new vehicles, the two-component urethane systems will cover the plastics as well as the traditional metal body components.

Though differing with Harrick's views of the comparison of urethane-based with nonisocyanate paint, the views of H. James Robinson, vice president and general manager of automotive refinishing for the Inmont division of BASF, do jibe with Harrick's overall assessment of the automotive refinishing business. "I can't be real optimistic about growth in the automotive refinishing business, but I am confident that we will be holding our own share of the market," says Robinson.

Robinson also cites the improved corrosion resistance of coatings used

by OEMs as a reason for the drop-off in corrosion repairs. "It is partly due to the cathodic electrical priming coat we and our competitors have supplied to the automotive industry. That has affected our automotive paint business, and overall I guess it's good," he says.

Currently the automotive refinishing business is consolidating, Robinson says. Like European body shops, American shops will become more sophisticated, requiring more expensive equipment such as downdraft booths and ovens to do a good job. And as the OEM market uses more base-coat/clear-coat technology, the refinish market will follow and will need better equipment to do the job, he says.

PPG sees its participation in the automotive refinish market as an extension of its business in the OEM market. "It's a global business for us," says Mike Sack, manager of customer services for PPG's coatings and resins division. "We're in it for the long haul," he adds.

Like its competitors, PPG supplies a full line of acrylic lacquers, alkyd and acrylic enamels, vinyls, and acrylic urethane products. But, says Sack, two-step base-coat/clear-coat technology is growing in automotive refinishing, following the trend in OEM.

PPG Industries photo

*Automotive spray painters must wear protective breathing equipment*

Though isocyanate-containing urethane finishes are not for general consumer use because of their toxicity, Sack says they have a definite place in the automotive refinish market. "They are a fact of life," he says, though "they have been given a bad rap. They are safe if used properly."

PPG, says Sack, wants to deal with professional painters. To help them use its products effectively, the company, like its competitors, runs training facilities. Two PPG training facilities are already in place in Delaware, Ohio, and Flint, Mich., aimed at educating PPG sales representatives and staff distributors, as well as body shop and fleet maintenance personnel. Two more facilities, to be staffed by PPG trainers, are on the drawing boards for New Jersey and the Los Angeles area, he says. In an effort to garner a larger share of the market, PPG also plans satellite classrooms at 10 to 15 other locations.

PPG has been at the forefront, Sack says, in developing a new generation of nonisocyanate-containing paints that deliver the same performance as an isocyanate-containing paint. The company's NCT clear coat applied over PPG's nonisocyanate Deltron base coat was introduced late in 1986 and, though it costs more than isocyanate-containing paints, has "done a remarkable job penetrating the market," claims Sack.

Problems with volatile organic emissions, an issue particularly on the OEM level, is not a big problem yet for auto body shops, Sack says. The typical repair does not require a lot of paint. PPG has low-volatility systems available now, he says, following on the growing demand for paint in the OEM market with low-volatility compounds.

Gene A. Gardner, refinishes director at Du Pont, says that the refinish business grows in pace with the overall economy. The only downturn occurred during the Arab oil embargo when people did not drive their cars as much. As a result, work on collision repairs, accounting for 90% of all paint refin-

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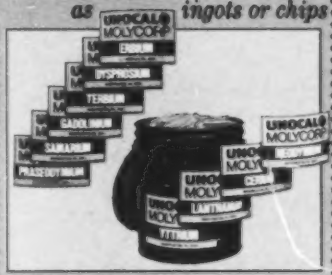

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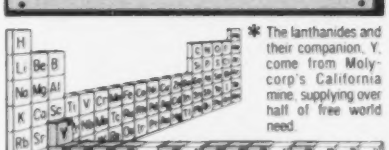

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ish work, was down. Gardner says that only 10% of refinishing paint sales are due to people who want to make their older car look new, or dealers who repaint a car to improve its resale value.

Du Pont is also sensitive to concerns that isocyanate-containing paints may pose a health hazard if they are used improperly, Gardner says. When they are used properly they work well, he stresses, and isocyanate-containing paints now make up 50% of Du Pont's automotive refinish paint sales. Du Pont does offer a nonisocyanate-containing paint—it introduced its Cronar paint system in January this year, Gardner says.

Although Du Pont does supply waterborne base coats for OEM markets, Gardner thinks it will be several years before waterborne technology may be used in the refinish business. Temperature and humidity conditions can be rigidly controlled at the OEM level. But the majority of body shops in the U.S. do not now have the advanced, expensive spray booths and ovens to allow them the precise control over paint application and drying conditions. Lacquer and enamel refinish systems now widely used in the refinishing business can be used on spot repairs and still match the new OEM paint systems.

Du Pont also provides training centers for its jobber salesmen in Troy, Mich., Atlanta, and Los Angeles. Du Pont has 28 training centers located at its warehouses across the U.S. providing body shop personnel with instructions on safe use, color matching, and other facets of paint preparation and refinish.

Like others in the automotive refinish business, Du Pont is watching for the possible entry of ICI into the U.S. automotive refinish business. Gardner notes that Du Pont actively competes with ICI in Europe and thinks it may just be a matter of time before ICI enters the U.S. market via Glidden. However, he says, "We're familiar with what they do and how they do it."

Indeed, ICI will be actively examining the possibility of entering the automotive paint business in the U.S. via Glidden, says Brian S. Codling, ICI Autocolour's general manager. Codling claims that ICI is the largest automotive refinishing paint supplier outside the U.S. "If we see the right opportunity, we will get

PPG Industries photo

*Automotive market consumed about $895 million worth of paint last year*

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in the U.S. market," he says. "We wouldn't just jump in. We respect Du Pont, PPG, Inmont, and the others already there."

In Europe, there has been a reduction in the number of small independent body shops, says Codling. Owners of surviving shops have invested in ovens, spray booths, and other expensive advanced equipment so they can refinish cars more quickly and get the maximum return on their investment, he says. This is particularly true in larger cities where there are more chain-type operations in the auto body repair market than there were a few years earlier.

It is also in the larger cities, particularly in West Germany, that local authorities are concerned about volatile organic emissions, says Codling. As a result, he thinks the market will be ripe for ICI's Aquabase waterborne base-coat system between 1990 and 1992.

Noting the current trend among paint makers in the U.S. to launch nonisocyanate-containing refinishing paints, Codling says that ICI launched such a paint in the European market a few years ago. "They weren't as good as two-pack acrylics," he says flatly. He adds that "if you are going for a fast-curing paint you need a rapid chemical reaction, and as such that will pose a danger to humans." ICI, he says, still professes the use of isocyanate-cured paint systems while emphasizing the safe applications of those paints.

Sikkens, a division of the Dutch chemical company Akzo, competes in Europe with ICI and others in the automotive OEM and refinishes market. In the U.S., the company operates as a division of Akzo Coatings America and supplies the automotive refinishes market. Sikkens has been a player in the U.S. automotive paint market only since 1980, says Gerald J. Burt, Sikkens' vice president of operations.

Sikkens' most recent U.S. product is an isocyanate-free, fast-drying paint called Autonova. Introduced in April this year, the paint offers the same quality finish as an acrylic urethane, Burt says. He terms the new Autonova product "more user friendly" than acrylic urethanes. Autonova is not being offered in Europe, Burt says, because most European shops, 90% of which are equipped with downdraft spray booths, are better equipped to handle isocyanate-containing paint formulations.

At present, he says, Sikkens' largest selling product is an isocyanate-containing acrylic urethane paint. But, he adds, "We're concerned about the isocyanate issue, both in the U.S. and in Europe." However, in the U.S., "people think they are invincible, even after all the education about isocyanates. Major body shop managers at dealerships don't even know what isocyanates are and what precautions are necessary when they are being used."

Unlike its competitors in the U.S., Sikkens does not supply factory-packed colors to match OEM paint formulations, Burt says. A carousel color-matching machine, with 80 different toners mounted in place, "can match any OEM color from an Alfa Romeo to a Zag, whatever that is," he says. Paints also can be mixed only in the actual quantities needed, thus producing a savings in materials costs, where paint costs to repair shops can run as high as $40 a gal for the better-quality paints.

Given all the concern with isocyanate formulations, one paint industry supplier, Monsanto, is developing proprietary new technology to displace isocyanates. The company will discuss the development of a "nonamino condensation curing product" for the paint industry at the Paint Show in Dallas in October, according to an industry source.

As a supplier of acrylic polyols to the automotive refinish industry with an interest in new product developments, Rohm & Haas believes that new curing technology introduced by Du Pont, PPG, and Sikkens is the wave of the future. "Water-based automotive refinishing paint technology is a long way down the road," says Dave M. Watson, Rohm & Haas' market manager for solvent-borne industrial coatings. And though the trend is for formulators to move away from alkyd acrylic modified urethanes, it still won't affect the demand for alkyds or Rohm & Haas' own Acryloid acrylics, he adds.


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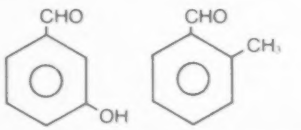


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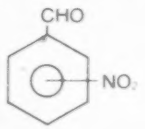


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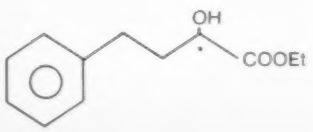


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# Coil coaters look for growth in appliance, metal furniture markets

Faced with losses in the transportation market, paint makers supplying coil coatings are basing their hopes on the appliance market and are trying to develop uses for the coatings in office furniture.

Following a high in 1984, shipments of weldable zinc-rich coil-coated steel dropped again last year. According to Jeff Back, project manager with market research firm Charles H. Kline & Co., auto makers have replaced zinc-rich weldable coatings with newer, in-plant cathodic electrical priming systems. As Back sees it, "Coil coaters are scrambling to replace the business. It will be a struggle for them." Though they are "targeting the appliance business, I suspect it will be difficult for them to replace the business they've lost on the automotive side," he says.

Between 1984 and 1986, the overall market for coil-coated steel and aluminum declined as shipments fell 22% to 7.68 billion lb, statistics from the National Coil Coaters Association (NCCA) show. The market for coil-coated steel for the transportation market alone fell 26% during the same period.

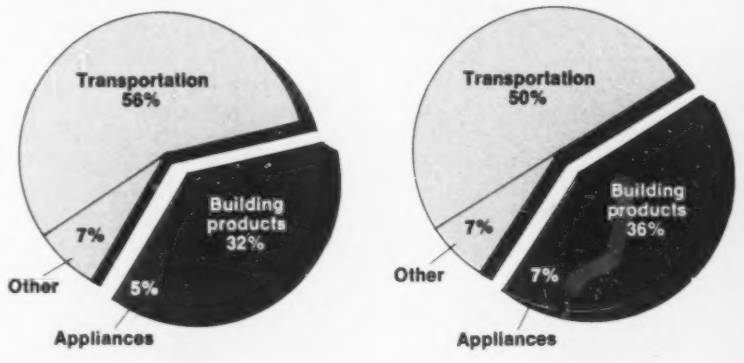
Back's skepticism that the appliance market can take up the slack is supported by NCCA statistics. Shipments of coil-coated steel for appliances grew just 12% between 1984 and 1986 to 266 million lb. As a percent of overall shipments of steel coil-coatings, appliances' share increased from 4.7% in 1984 to 6.4% last year.

But Robert W. Moorman, market manager for coil-extrusion coatings at Glidden, envisions that new paint technology will help coil coaters regain share for wide sheet coil-coated steel and will help coil coatings further penetrate the appliance and office furniture market. One coil coater already has provided preprimed steel coil with a primer coat that is flexible enough to maintain its adhesion and integrity during stamping of metal body panels, Moorman says.

Experiments in stamping preprimed and painted coil-coated steel hoods and decks have been carried out, and such applications could be a reality in automotive manufacturing "in the early 1990s if manufacturers would embrace the technology," Moorman adds. Though coil-coated parts are already widely used under vehicle hoods, getting coil coatings back on vehicle exteriors "is a major target for the future," said Moorman.

The increasing use of coil-coated parts by appliance makers is also encouraging, Moorman says. "Ap-

**As transportation market for coil coatings shrinks, building products and appliances markets grow**




Total 1984 = 5.01 billion lb

Total 1986 = 4.19 billion lb

**Note:** Totals include Canada and Mexico, and are based on actual tonnage supplied by reporting companies.
**Source:** National Coil Coaters Association

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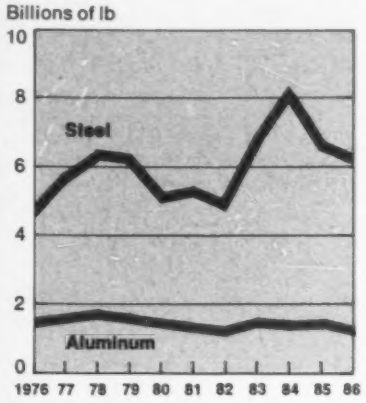
**Shipments of coil-coated steel, aluminum have fallen**




**Note:** Figures include Canada and Mexico.
**Source:** National Coil Coaters Association

pliance manufacturers do not necessarily want to be painters," he says. The government's clamping down on emissions of volatile organic compounds also will provide additional incentive for appliance makers to look to coil coaters for prepainted parts.

In addition, metal office furniture, now painted by the manufacturer, could be made of precoated steel, Moorman says. He sees a market developing for filing cabinets, desks, credenzas, and partitions, all of coil-coated steel. Moorman thinks this market will materialize because it's a more efficient way to produce metal furniture. Coil-coating transfer of paint to metal is 97% efficient, he says, and requires one sixth of the curing energy required to bake dry a metal cabinet or desk because coil coatings are processed on a flat continuous line.

Steel furniture producers, like appliance manufacturers, would not have any significant emission problems with volatile organic compounds. Coil coaters generally operate in plants that burn off solvent evaporated from coils in their ovens to provide additional curing energy as well as heat for plant facilities.

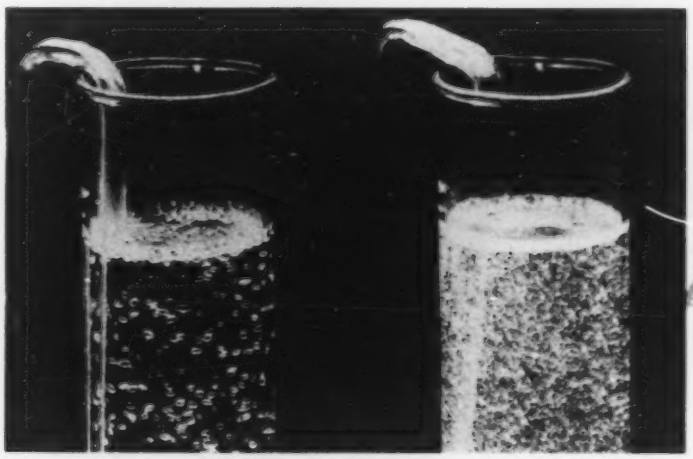
Although steel furniture is now welded together for assembly, Moorman says, new systems are being developed to put together coil-coated furniture with either adhesives, clips, or bolts. Adhesives, such as epoxies, polybutenes, and polysulfides, offer the most promise for metal furniture assembly because they are the least labor- and capital-intensive.

Industry analyst Back is more bullish about prospects for coil-coated aluminum than for steel. He sees good to modest growth ahead for this smaller segment of the coil-coating business, translating into steady business for paint suppliers. The market has stabilized, he believes, because vinyl building siding has secured its niche and probably will not gain a larger share of the market than it already has. Aluminum beverage cans, says Back, are a stable business and a strong market for aluminum minislat window blinds also is likely to promote growth in the aluminum coil-coatings market.

George F. Detrick, building products market manager for Rohm & Haas, agrees with Back that vinyl siding sales will not displace any more aluminum siding. Because that business has consolidated, Rohm & Haas says it is doing more business as a merchant supplier providing paint formulators active in this business with its Rhoplex acrylic emulsions.

The acrylic emulsions used in coating aluminum are waterborne, and so there is very little concern about volatile organic emissions, says Detrick. "The industry switched to waterborne coatings a while ago. Aluminum coil coaters found they could readily obtain the durability they required from waterborne systems. Only some toll coil coaters prefer solvent-based aluminum coating systems because they claim they can change colors and clean up their equipment for the change more quickly."

Waterborne primers for aluminum coils are making inroads, says Detrick, and they are suitable for toll coaters because a standard primer color can be used under any num-

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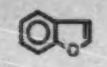

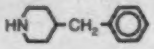

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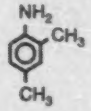

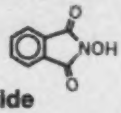

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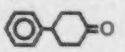

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## Product Report

ber of different topcoat colors. In cases in which coaters may object to using waterborne coatings for fear they may experience equipment corrosion problems and coil-covering flaws, some engineering changes in the equipment may be necessary, he says. "Roller pins and reservoirs for waterborne coatings must be designed differently than for machinery running solvent systems," he explains.

Another supplier to coil coatings paint formulators, Monsanto Chemical, is bullish on growth in coil-coating applications in the appliance market and for steel office furniture. "Precoating steel for the appliance and steel furniture market will help manufacturers reduce their costs and turnaround time and also allow them to produce a more uniform product," says Michael W. Berezo, amino resins business manager of Monsanto Chemical's resin division.

Monsanto supplies high-solids methylated melamines used as crosslinking agents in paint formulations. Its Resimine 747 for solvent-based formulas and 745 for waterborne systems "are our bread and butter crosslinkers," he says. Crosslinking agents aid the curing process as painted coils pass through drying ovens.

Monsanto has the capability to tailormake a crosslinking agent for coil coatings aimed at the appliance and steel furniture markets, Berezo points out. A good crosslinking agent for these applications would help in developing coatings with the right balance of properties. What the user wants, he says, is a hard film with good integrity. However, the film must be flexible enough to bend into form and still adhere solidiy to the substrate. The film also must resist oil and grease.

The company introduced a new methylated melamine crosslinking agent, Resimine 797, last year. It aids the rapid drying of baked coatings but at a lower temperature than can be achieved with other methylated melamine crosslinking agents in Monsanto's line, Berezo says. Coil coatings using the new additive may cure at lower temperatures to achieve film quality similar to that from Resimine 747 and 745, he claims. □


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